



Exploring a Nearby Habitable World Orbiting an M-dwarf star

**Drake Deming
NASA's Goddard Space Flight Center**

The background of the slide is a black and white photograph. The top half shows a sky with large, bright, fluffy clouds. The bottom half shows a body of water with a textured, rippled surface. The text is overlaid on this image.

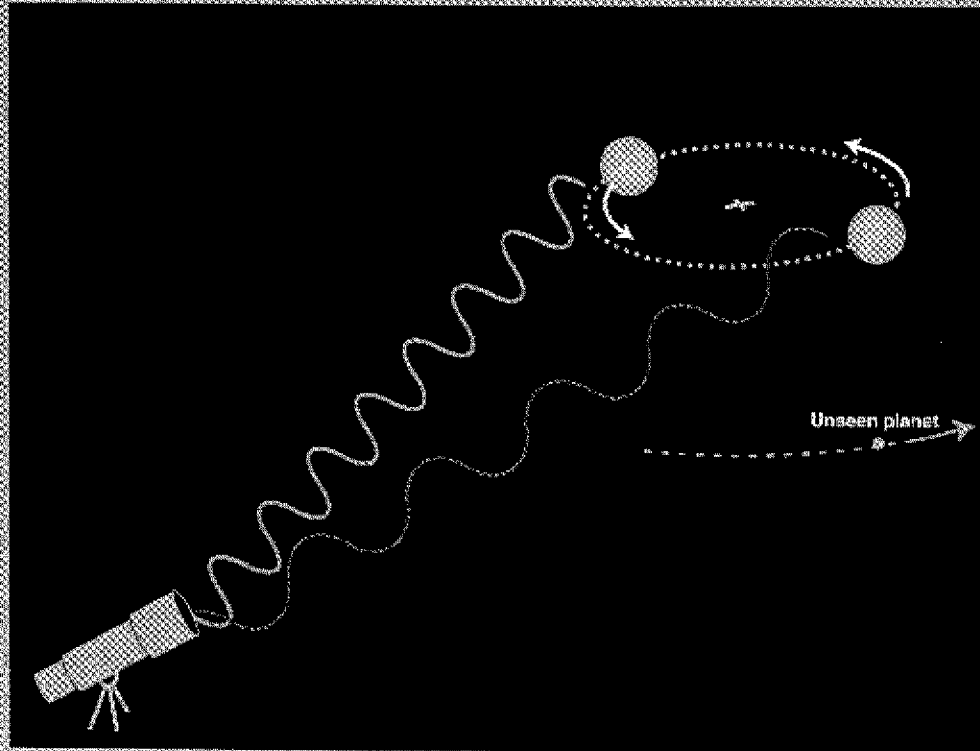
This talk will discuss:

**The landscape of extrasolar planets
.....and detection techniques**

Some history

**How to find and characterize a habitable world
.....using transits**

Most of the > 450 exoplanets have been detected using radial velocities

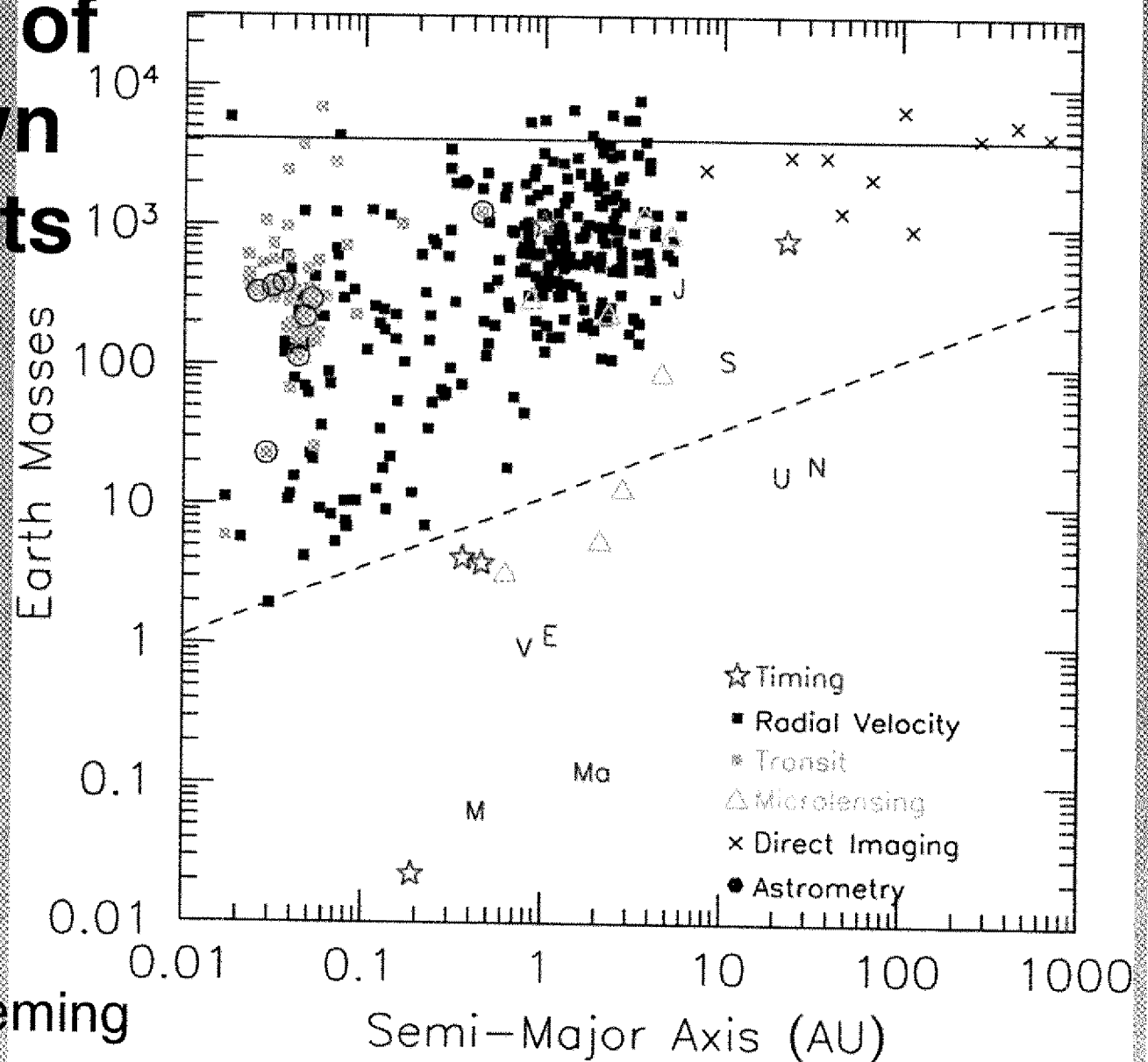


**...an *indirect* detection:
light from the planet is not measured**

Summary of the known exoplanets

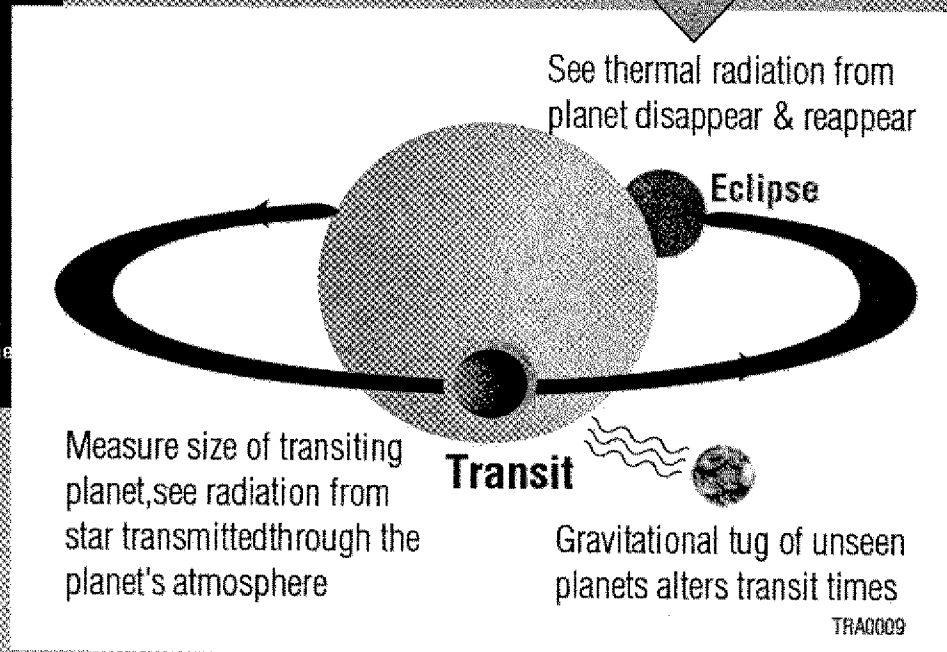
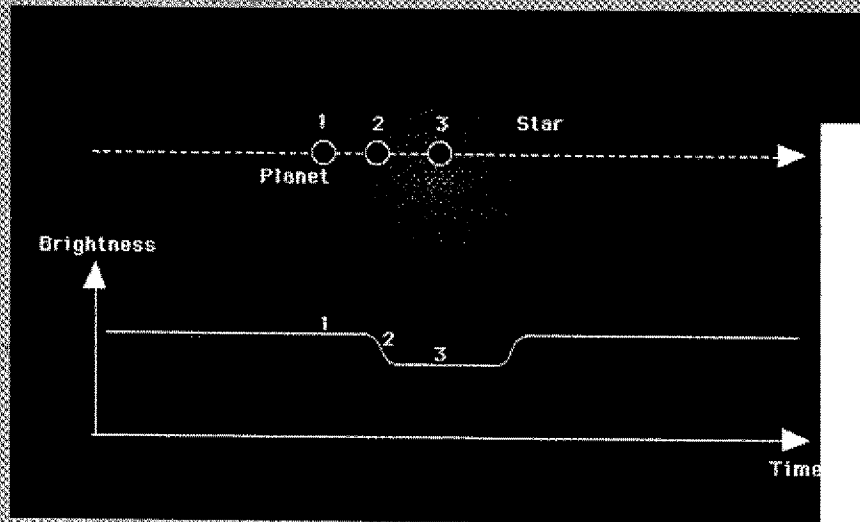
Deming & Seager
review in Nature
462, 301 (2009)

Also, Seager & Deming
ARAA (2010)

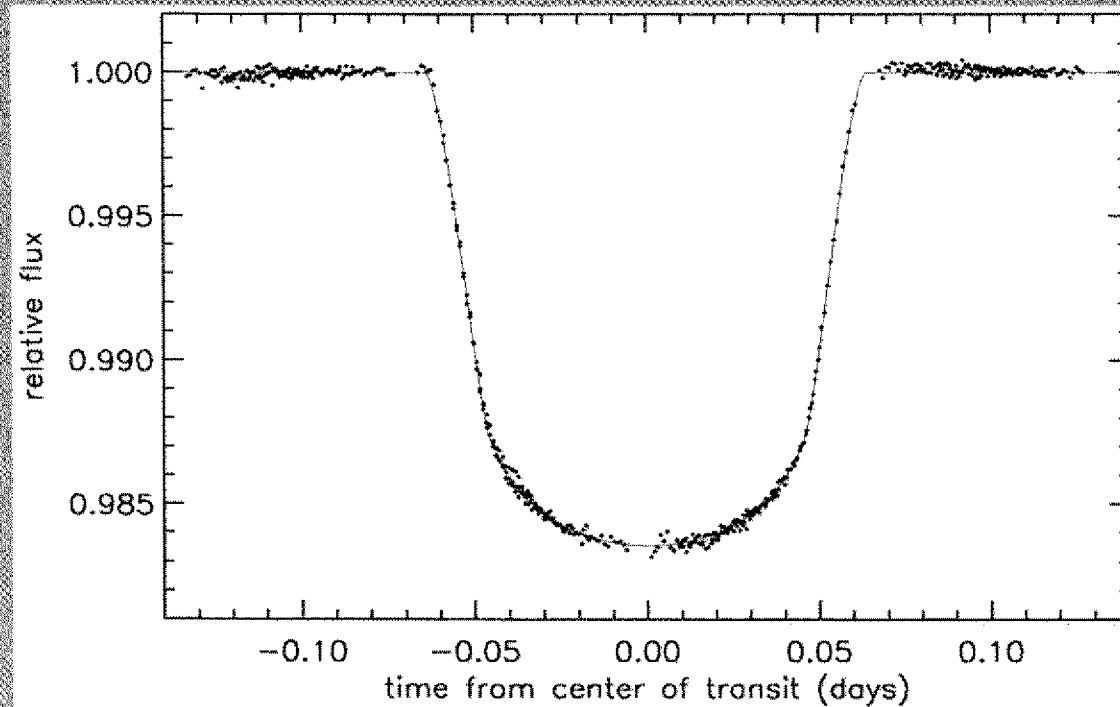


Exploit transits to characterize SuperEarth Atmospheres...

Direct detection
of light from the planet



Can we characterize the atmosphere of a SuperEarth using transits...? A habitable one??

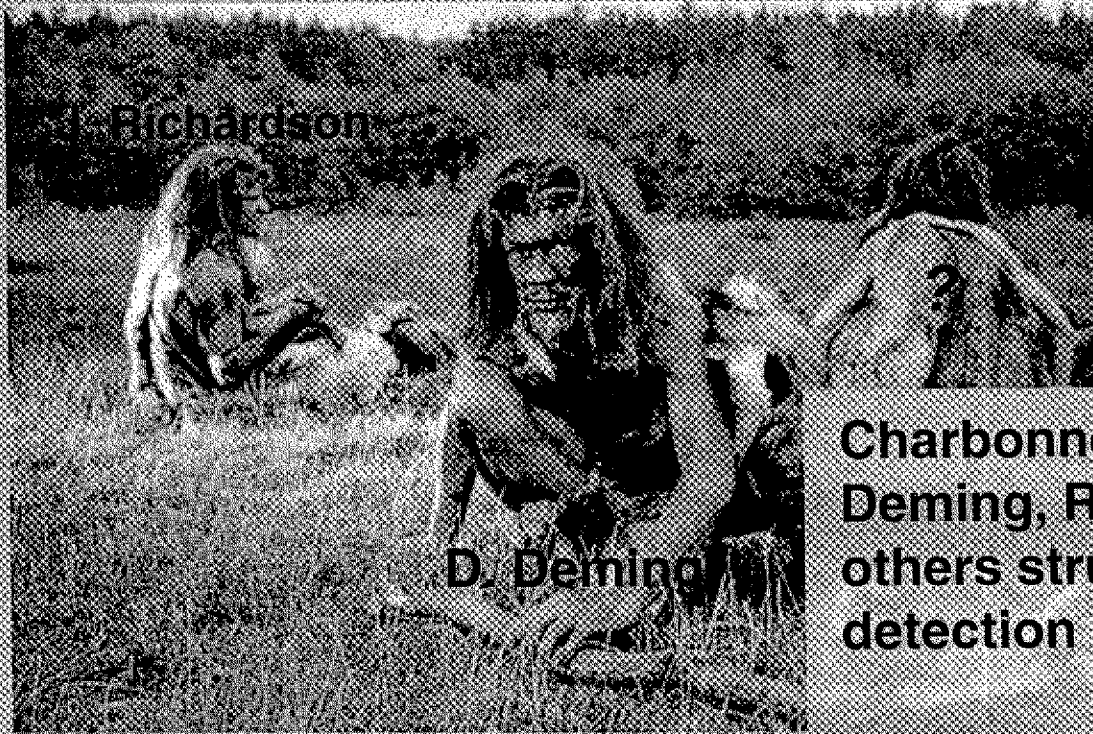


Brown et al. 2001, ApJ 552, 699

Transit data immediately yield the planet's bulk properties - mass ($0.69 M_J$) and radius ($1.35 R_J$)

➡ Can we characterize the atmosphere?

Emitted/reflected spectra of hot Jupiters in the paleolithic age (1999-2003)



Charbonneau, Brown, Collier-Cameron, Deming, Richardson, Wiedemann, and others struggled towards ground-based detection

